IN THE CLAIMS

Please amend the claims to read as follows:

Listing of Claims

1. (Currently Amended) A communication apparatus employing a multi-carrier transmission method which performs data transmission with digital multi-carrier modulation and demodulation processes utilizing a real coefficient wavelet filter bank, ~~which comprises~~ the communication apparatus comprising a receiver that performs a digital multi-carrier demodulation process, wherein

the receiver having a wave detecting section,

the wave detecting section has:

a first wavelet transformer involving M real coefficient wavelet filters, which are orthogonal with respect to each other, for performing a wavelet transform of waveform data of received signal;

a Hilbert transformer for performing a Hilbert transform of the waveform data;

a second wavelet transformer for performing a wavelet transform of outputs from the Hilbert transformer; and

a complex data generator for generating complex data, by defining outputs from the first wavelet transformer as in-phase

components of complex information and outputs from the second wavelet transformer as orthogonal components of the complex information.

2. (Original) The communication apparatus according to claim 1, further comprising:

a code converter for inverting codes of outputs in odd-numbered places among M outputs from the second wavelet transformer.

3. (Original) The communication apparatus according to claim 2, further comprising:

a level converter for correcting fluctuation of amplitude of outputs from the code converter, which is caused by a ripple of the Hilbert transformer.

4. (Currently Amended) A communication apparatus employing a multi-carrier transmission method which performs data transmission with digital multi-carrier modulation and demodulation processes utilizing a real coefficient wavelet filter bank, ~~which comprises~~ the communication apparatus comprising a receiver that performs a digital multi-carrier demodulation process, wherein

the receiver having a wave detecting section,

the wave detecting section has:

a first wavelet transformer involving M real coefficient wavelet filters, which are orthogonal with respect to each other, for performing a wavelet transform of waveform data of received signal;

a second wavelet transformer involving wavelet filters for performing a Hilbert transform, a wavelet transform, and an inversion of codes in odd-numbered places, for the waveform data; and

a complex data generator for generating complex data, by defining outputs from the first wavelet transformer as in-phase components of the complex information and outputs from the second wavelet transformer as orthogonal components of the complex information.

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5. (Currently Amended) The communication apparatus according to claim 1, wherein

the first wavelet transformer has a first prototype filter including a first polyphase filter which possesses a real coefficient, M down samplers, M-1 one-sample delaying elements, and a fast M-points discrete cosine transformer (M is an integer not less than 2), and

the second wavelet transformer has a second prototype filter including a second polyphase filter which possesses a real coefficient, M down samplers, M-1 one-sample delaying elements, and a fast M-points discrete sine transformer.

5. (Currently Amended) The communication apparatus according to claim 1, wherein

the second wavelet transformer has a third prototype filter including a second polyphase filter which possesses a real coefficient, M down samplers, M-1 one-sample delaying elements, a time series inverter for inverting sequence of every M inputs among an input series, a fast M-points discrete cosine transformer, and a code converter for inverting codes in odd-numbered places in the input series.

6. (Previously Presented) The communication apparatus according to claim 1, wherein

the receiver further has:

an equalizer for performing equalization using both complex information obtained from the wave detecting section and known signal for equalization that is previously assigned for the equalization process; and

a decision unit for making a decision using a signal obtained from the equalizer.

8. (Currently Amended) A communication apparatus employing a multi-carrier transmission method which performs data transmission with digital multi-carrier modulation and demodulation processes utilizing a real coefficient wavelet filter bank, ~~which comprises~~ the communication apparatus comprising a transmitter that performs a digital multi-carrier modulation process and a receiver that performs a digital multi-carrier demodulation process, wherein the transmitter has:

a synchronization data generator for generating data for synchronization that are known in the receiver; and

an inverse wavelet transformer for performing an inverse wavelet transform of the synchronization data, and

the receiver has:

a wave detecting section having a first wavelet transformer involving M real coefficient wavelet filters, which are orthogonal with respect to each other, for performing a wavelet transform of waveform data of received signal; a Hilbert transformer for performing a Hilbert transform of the waveform data; a second wavelet transformer for performing a wavelet transform of outputs from the Hilbert transformer; and a complex

data generator for generating complex data, by defining outputs from the first wavelet transformer as in-phase components of complex information and outputs from the second wavelet transformer as orthogonal components of the complex information;

an equalizer for performing equalization using both complex information obtained from the wave detecting section and known signal for equalization that is previously assigned for the equalization process;

a decision unit for making a decision using a signal obtained from the equalizer; and

a synchronization timing estimating circuit for estimating a timing of synchronization from phase difference between adjacent complex subcarriers output from the wave detecting section.

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9. (Currently Amended) A communication apparatus employing a multi-carrier transmission method which performs data transmission with digital multi-carrier modulation and demodulation processes utilizing a real coefficient wavelet filter bank, ~~which comprises~~ the communication apparatus comprising a transmitter that performs a digital multi-carrier modulation process and a receiver that performs a digital multi-carrier demodulation process, wherein

the transmitter has:

a synchronization data generator for generating data for synchronization that are known in the receiver; and

an inverse wavelet transformer for performing an inverse wavelet transform of the synchronization data, and

a wave detecting section of the receiver has:

a wavelet transformer involving M real coefficient wavelet filters, which are orthogonal with respect to each other, for performing a wavelet transform of waveform data of received signal;

a complex data generator for generating complex data, by defining (2n-1)th outputs(n is a positive integer) from the wavelet transformer as in-phase components of the complex information and 2n-th outputs (where $1 \leq n \leq (M/2-1)$ and subcarriers are numbered from 0 to M-1) from the wavelet transformer as orthogonal components of the same.

10. (Currently Amended) A communication apparatus employing a multi-carrier transmission method which performs data transmission with digital multi-carrier modulation and demodulation processes utilizing a real coefficient wavelet filter bank, ~~which comprises~~ the communication apparatus comprising a transmitter that performs a digital multi-carrier

modulation process and a receiver that performs a digital multi-carrier demodulation process, wherein

a modulating section of the transmitter has:

a symbol mapper for converting bit data into symbol data and mapping the symbol data to M/2 (M is a plural number) complex coordinate planes;

an inverse wavelet transformer involving M real coefficient wavelet filters, which are orthogonal with respect to each other; and

a complex data decomposer for decomposing complex data into a real part and an imaginary part such that in-phase components of the complex information are supplied to the inverse wavelet transformer as (2n-1)th (n is a positive integer) inputs and such that orthogonal components of the complex information are supplied to the inverse wavelet transformer as 2n-th (where $1 \leq n \leq (M/2-1)$ and subcarriers are numbered from 0 to M-1) inputs.

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11. (Currently Amended) A communication apparatus employing a multi-carrier transmission method which performs data transmission with digital multi-carrier modulation and demodulation processes utilizing a real coefficient wavelet filter bank, ~~which comprises~~ the communication apparatus comprising a transmitter that performs a digital multi-carrier

modulation process and a receiver that performs a digital multi-carrier demodulation process, wherein

the transmitter has:

a synchronization data generator for generating data for synchronization that are known in the receiver; and

a modulating section for modulating with the synchronization data,

the receiver has:

a wave detecting section having a wavelet transformer involving M real coefficient wavelet filters, which are orthogonal with respect to each other, for performing a wavelet transform of waveform data of received signal; a complex data generator for generating complex data, by defining (2n-1)th outputs(n is a positive integer) from the wavelet transformer as in-phase components of the complex information and 2n-th outputs (where $1 \leq n \leq (M/2-1)$ and subcarriers are numbered from 0 to M-1) from the wavelet transformer as orthogonal components of the same; and

a synchronization timing estimation circuit for estimating a timing of synchronization from phase difference between adjacent complex subcarriers.

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12. (Currently Amended) The communication apparatus according to claim 8, wherein

the receiver has:

an equalizer for obtaining an equivalent coefficient to be used for each subcarrier by synthesizing (2n-1)-th outputs and 2n-th outputs ($1 \leq n \leq (M/2-1)$, the subcarriers being numbered from 0 to M-1) with complex information obtained from the wave detecting section; and

a decision unit for making a decision using signal obtained from the equalizer.

13-14. (Canceled).